

Schools and Teachers as Barriers to the Integration of ICT into Teaching and Learning Environments: A Review of the literature with an addendum on the Kenyan situation.

Jared Nyachoti Kimanga

Kenyatta University. School of Education. Department of Educational Communication and Technology
kimanga.jared@ku.ac.ke

ABSTRACT

It has been a long cherished and declared ambition of the government of the republic of Kenya to integrate ICT into the teaching and learning environment at all levels of the school system starting from the elementary classes right up to university level. This paper looks into the barriers such a project is likely to run into and isolates two types of barrier for detailed analysis namely teacher-level barriers and school-level barriers. The declared intentions of the government of Kenya are outlined in addendum and recommendations made on possible ways to overcome the identified barriers.

Key words: Information Communication Technology, Knowledge, Education, Training, Integration, Barrier

INTRODUCTION

Information and communication technology (ICT) skills play a key role in promoting the economic development of a country. Many of the productivity gains in the developed world economies over the past two decades can, to a large extent, be attributed to the impact of ICT.

One of the observations made at the National Conference on Education and Training held in Nairobi in November 2003, according to Sessional Paper No. 1 of 2005 that was a product of the conference was that technology is a critical form of wealth to any nation. For this reason it is anticipated that innovation, research, development, information and communication technology (ICT) and science and technology would form one of the key pillars of education and training in Kenya.

REVIEW OF THE LITERATURE

Information and communication technology (ICT) has become an important part of most organizations and businesses these days [1]. Computers began to be placed in schools in the early 1980s, and several researchers suggest that ICT will be an important part of education for the next generation too [2]; [3]; [4]. Modern

technology offers many means of improving teaching and learning in the classroom [5].

[6] is of the view that new technologies have the potential to support education across the curriculum and provide opportunities for effective communication between teachers and students in ways that have not been possible before. ICT in education has the potential to be influential in bringing about changes in ways of teaching. However, this potential may not easily be realized, as [6] underlined when he stated that “Problems arise when teachers are expected to implement changes in what may well be adverse circumstances” (p.61).

Due to ICT’s importance in society and possibly in the future of education, identifying the possible obstacles to the integration of these technologies in schools would be an important step in improving the quality of teaching and learning. [7] argue that although educators appear to acknowledge the value of ICT in schools, difficulties continue to be encountered during the processes of adopting these technologies.

THE IMPORTANCE OF ICT IN EDUCATION

Several studies argue that use of new technologies in the classroom is essential for providing opportunities for students to learn to operate in an information age. It is evident, as [4] argued, that traditional educational environments do not seem to be suitable for preparing learners to function or be productive in the workplaces of today's society. She claimed that societies that do not incorporate the use of new technologies in schools cannot seriously claim to prepare their students for life in the twenty-first century. This argument is supported by [3] who pointed out that "by teaching ICT skills in primary schools the pupils are prepared to face future developments based on proper understanding"

Similarly, [2] reported that "what is now known about learning provides important guidelines for uses of technology that can help students and teachers develop the competencies needed for the twenty-first century"

ICT can play various roles in learning and teaching processes. According to [2], several studies have reviewed the literature on ICT and learning and have concluded that it has great potential to enhance student achievement and teacher learning. [8] points out that technology can play a part in supporting face-to-face teaching and learning in the classroom. Many researchers and theorists assert that the use of computers can help students to become knowledgeable, reduce the amount of direct instruction given to them, and give teachers an opportunity to help those students with particular needs [9], [10]; [11].

While new technologies can help teachers enhance their pedagogical practice, they can also assist students in their learning. According to [12], technologies can play a role

in student skills, motivation and knowledge. They claim that ICT can be used to present information to students and help them complete learning tasks.

According to [13], five factors influence the likelihood that good ICT learning opportunities will develop in schools: ICT resourcing, ICT leadership, ICT teaching, school leadership and general teaching. [13] also indicated that the success of the integration of new technology into education varies from curriculum to curriculum, place to place, and class to class, depending on the ways in which it is applied.

BARRIERS TO THE INTEGRATION OF ICT INTO TEACHING AND LEARNING.

The act of integrating ICT into teaching and learning is a complex process and one that may well encounter a number of difficulties. These difficulties are known as "barriers" [14]. A barrier is defined as "any condition that makes it difficult to make progress or to achieve an objective" (WordNet, 1997, as cited in [14]).

CLASSIFICATION OF THE BARRIERS

Several studies have divided the barriers into two categories: *extrinsic* and *intrinsic* barriers. However, what they meant by extrinsic and intrinsic differed. In one study, [15] referred to extrinsic barriers as *first order* and cited access, time, support, resources and training and intrinsic barriers as *second order* and cited attitudes, beliefs, practices and resistance; whereas Hendren(2000), as cited in [16] saw extrinsic barriers as pertaining to organizations rather than individuals and intrinsic barriers as pertaining to individuals i.e. Teachers, administrators and learners.

Another classification found in the literature is teacher – level barriers versus school- level barriers. [17] grouped the barriers according to

whether they relate to the individual (teacher level barriers) such as lack of time, lack of confidence and resistance to change, or to the institution (school – level barriers), such as lack of effective training in solving technical problems and lack of access to resources. Similarly, [7] divide barriers into micro- level barriers, including those related to teachers' attitudes and approach to ICT and meso-level barriers, including those related to the institutional context. The latter added a third category called macro-level (system level barriers), including those related to the wider educational framework.

Another perspective presents the obstacles as pertaining to two kinds of conditions: material and non- material [18]. The material conditions may be insufficient numbers of computers or copies of software. The non- material obstacles include teachers' insufficient ICT knowledge and skills, the difficulty of integrating ICT in instruction and insufficient teacher time.

TEACHER- LEVEL BARRIERS

Lack of teacher confidence: Several researchers indicate that one barrier that prevents teachers from using ICT in their teaching is lack of confidence. [6] sees this as a contextual factor which can act as a barrier. According to [17], much of the research proposes that this is a major barrier to the uptake of ICT by teachers in the classroom. In [17] survey of practitioners, the issue of lack of confidence was the area that attracted most response from those that took part.

Some studies have investigated the reasons for teachers' lack of confidence with the use of ICT. For example, [19] asserted that teachers' fear of failure caused a lack of confidence. On the other hand, [7] found that limitations in teachers' ICT knowledge makes them feel anxious about using ICT in the classroom and

thus not confident to use it in their teaching. Similarly, [17] concluded their study with the statement “ many teachers who do not consider themselves to be well skilled in using ICT feel anxious about using it in front of a class of children who perhaps know more than they do.” In [17] survey, many of the teacher respondents who identified their lack of confidence as a barrier reported being particularly afraid of entering the classroom with limited knowledge in the area of ICT with their students knowing this was the case. It was argued that lack of confidence and experience with technology influence teachers' motivation to use ICT in the classroom [20]; [21]; [7].

On the other hand, teachers who confidently use technologies in their classrooms understand the usefulness of ICT. [22] found that teachers who have confidence in using ICT identify that technologies are helpful in their teaching and personal work and they need to extend their use farther in the future.

Lack of teacher competence: Another barrier, which is directly related to teacher confidence, is teachers' competence in integrating ICT into pedagogical practice. In Australian research, [23] found that many teachers lacked the knowledge and skills to use computers and were not enthusiastic about the changes and integration of supplementary learning associated with bringing computer learning into their teaching practices.

Current research has shown that the level of this barrier differs from country to country. In the developing countries, research reported that teachers' lack of technological competence is a main barrier to their acceptance and adoption of ICT [18]; [24].

[25] produced a report on the use of ICT in European schools. The data used for the report

came from the head teachers' and classroom teachers' survey carried out in 27 European countries. The findings show that teachers who do not use computers in classrooms claim that lack of skills is a constraining factor preventing teachers from using ICT for teaching.

Resistance to change and negative attitudes: Much research into the barriers to the integrating of ICT into education found that teacher attitudes and inherent resistance to change was a significant barrier. [17] argued that resistance to change is an important barrier to teachers' use of new technologies in education.

[26], an Australian researcher, argued that integrating the new technologies into educational settings requires change and different teachers will handle this change differently. According to him, considering different teachers' attitudes to change is important because teachers' beliefs influence what they do in classrooms. [17] claims that one key area of teachers' attitudes towards the use of technology is their understanding of how these technologies will benefit their teaching and their students' learning. [14] study found that although teachers felt that there was more than enough technology available, they did not believe that they were being supported, guided or rewarded in the integration of technology into their teaching. According to [25], teachers who are not using new technology such as computers in the classroom are still of the opinion that the use of ICT has no benefits or unclear benefits.

SCHOOL-LEVEL BARRIERS

Lack of time: Several recent studies indicate that many teachers have competence and confidence in using computers in the classroom but they still make little use of technologies because they do not have enough

time. A significant number of researchers identified time limitations and the difficulty in scheduling enough computer time for classes as a barrier to teachers' use of ICT in their teaching. According to [27], the most common challenge reported by all teachers was the lack of time they had to plan technology lessons, explore the different internet sites, or look at various aspects of educational software.

Lack of effective training: One finding of [18] study was that there were not enough training opportunities for teachers in the use of ICTs in a classroom environment.

Similarly, [19] found that one of the top three barriers to teachers' use of ICT in teaching students was the lack of training.

[14] argues that when new technologies need to be integrated in the classroom, teachers have to be trained in the use of these particular ICTs. According to [23] some initial training is needed for teachers to develop appropriate skills, knowledge and attitudes regarding the effective use of computers to support learning by their students. He argues that this also requires continuing provision of professional development to maintain appropriate skills and knowledge.

Lack of accessibility: In [27] study teachers complained about how difficult it was to always have access to computers. The author gave reasons like "computers had to be booked in advance and the teachers would forget to do so, or they could not book them for several periods in a row when they wanted to work on several projects with the students." In other words, a teacher would not access ICT materials because most of these were shared with other teachers.

Lack of technical support: Without both good technical support in the classroom and whole

school resources, teachers cannot be expected to overcome the barriers preventing them from using ICT [28]. [18] found that in the view of primary and secondary teachers, one of the top barriers to ICT use in education was lack of technical assistance.

DISCUSSION

There are multifaceted relationships between the barriers. Some barriers such as lack of teachers' competence and lack of accessibility seem to be closely related to others. Some barriers such as lack of teacher confidence and resistance to change seem to be more significant than others.

The lack of accessibility to resources as a barrier is closely related to several other key issues which can themselves be considered barriers to teachers' use of ICT. Although the resources are available in schools, the lack of time does not allow teachers to access these resources.

Another example related to the accessibility barrier, is that lack of teacher training reduces the integration of technology into education. Educational technological materials may be available in schools but teachers cannot use them because of a lack of pedagogical skills related to training in how to use those ICT resources.

Access to resources might be possible but teachers cannot use ICT in the classroom because it may be difficult for them to operate the equipment. Thus teachers require technical support.

Lack of competence is linked to other issues such as training, time and technical support. Teacher training in the use of technology in the classroom helps to increase the teachers' efficiency in using ICT in education effectively. The improvement of ICT skills also requires that teachers have time available. Teachers in

schools that give them time to develop their skills can be more creative than teachers who do not have sufficient time.

ADDENDUM: THE KENYAN SITUATION

The government of Kenya appreciates and recognizes that an ICT literate work force is the foundation on which Kenya can acquire the status of a knowledge economy. Presently, however, there are a number of challenges facing access to and use of ICT in Kenya which include: high levels of poverty that hinder access to ICT facilities, limited rural electrification and frequent power disruptions. Where there is electricity, high cost of internet provision, costs associated with ICT equipment, inadequate infrastructure and little support hinder the application of ICT.

The ministry of education's policy on ICT is to integrate ICT education and training into education and training systems in order to prepare the learners and staff of today for the Kenyan economy of tomorrow and therefore enhance the nation's ICT skills. To address these needs, the government has committed to:

- i) Develop a national ICT education policy and strategy as well as facilitate the formation of a national ICT coordination mechanism with sectoral committees, one of which should represent the education sector.
- ii) Support and adopt the New Partnership for Development (NEPAD) recommendations for the development of ICT platforms and content in local languages.
- iii) Work with stakeholders to ensure implementation of the NEPAD e- School initiative under the NEPAD e- Africa commission.
- iv) Promote expanded use of ICT as a tool for effective management, research and

development, at all educational levels and use of internet for education, training and research.

- v) Develop a policy on the provision of adequate infrastructure at all levels of education and training by bringing together the efforts of all stakeholders.
- vi) Establish an ICT resource centre at the ministry headquarters for use by ministry of education staff and the general public.
- vii) Work with stakeholders to develop a strategy on ICT that addresses its use in all educational institutions and neighborhoods, incorporating access, content, and training of teachers and supply of ICT to the institutions.
- viii) Promote public and private sector investment in ICT within the education and training sector and
- ix) Provide computers to primary, secondary schools and Teachers' Training Colleges (TTCs).

To implement the policies outlined above the government will employ the following strategies:

- i) Facilitate universal access to ICT infrastructure i.e. power, equipment and improved connectivity in all institutions of learning in both the formal and non formal education sectors, including affirmative action for gender, Arid and Semi Arid Lands (ASAL), rural and urban poor schools, as well as those of special needs;
- ii) Establish an interactive website and mail communication channels to and within the ministry and outside the ministry.
- iii) Develop a project under the rural electrification programme that will help channel power to educational institutions to facilitate wider use of ICT.
- iv) Review of the telecommunication policy to support education, for example, preferential treatment of educational and training institutions.
- v) Establish controls at all levels of ICT integration to avoid abuse of schools-based ICT systems and ICT related crimes through incorporation of appropriate security measures in ICT infrastructure and content within data networks, and establish standards by correctly balancing user privacy and the protection of community values, establishment and recognition of cyber laws within Kenya's legal frameworks.
- vi) Develop sufficient capacity for the development and utilization of both computer hardware and software.
- vii) Develop a national capacity for curriculum design in all education and training subsectors to facilitate the use of ICT in service delivery so that access to quality educational services for learners at all levels of the education system is improved.
- viii) Build institutional and human capacity to facilitate the use of ICT in education and training and institutional management in order to improve the efficiency of educational administration and management at every level from the classroom, through school to the sector as a whole.
- ix) Provide teachers and education sector managers with access to information and tools to enable them to better deliver educational services.

- x) Promote Open and Distance Education (ODE) and virtual institutions particularly in higher education and training.
- xi) Regulate examinations and certification of ICT learning programmes in all sub- sectors.
- xii) Develop capacity for computer assembly and development of software and instructional materials to support e-learning.
- xiii) Develop special computers for learners with special needs.
- xiv) Develop modalities for cost reduction for ICT equipment and services.
- xv) Create partnerships that will facilitate greater dissemination of ICT services to rural areas.

SIGNIFICANCE OF THE STUDY

The integration of ICT into teaching and learning across the curriculum is now the norm the world over and Kenya is no exception. Indeed it is the government of Kenya's declared intention to introduce computer based instruction in schools from the lower primary and gradually roll out the programme up the education ladder. Towards this end the government has supplied thousands of tablet computers to primary schools throughout the country. This study is therefore important to the extent that it investigates and notes the challenges that arise in the bid to integrate ICT into teaching and learning. Recommendations are made in the hope that the challenges would be countered for the benefit of learners and teachers.

ETHICAL CONSIDERATIONS

This paper being a review of the literature a conscious effort has been made to adequately reference each and every source cited.

CONCLUSION

It is evident from the general review of the literature as well as from the affirmations by the government of Kenya, as outlined above, that information and communication technology has a direct role to play in education and if appropriately used ICT can bring many benefits to the classroom as well as education and training processes in general.

RECOMMENDATIONS

There are some general implications for teachers and schools for successful integration of ICT into education arising from the foregoing discussion:

1. Schools need to provide training courses for teachers to gain experience in dealing with new technologies.
2. Technical support needs to be provided in schools.
3. Schools must provide teachers with the necessary ICT resources including hardware and software.
4. Schools should provide teachers with sufficient time to implement new technologies in the classroom.
5. Teachers should take advantage of ICT resources offered at schools.

ABBREVIATIONS

ICT: Information Communication Technology

NEPAD: New Partnership for Development

ASAL: Arid and Semi-Arid Lands

TTCs: Teachers' Training Colleges

ODE: Open and Distance Education

ACKNOWLEDGEMENTS

This paper is a product of the work done in partial fulfillment of the coursework

requirements for award of the Doctor of Philosophy (PhD) degree in Curriculum and Instruction of Kisii University, Kenya.

REFERENCES

1. Zhang, P. & Aikman, S. (2007) *Attitudes in ICT acceptance and use* In J. Jacko (Ed.) *Human Computer Interaction, Part 1* (pp. 1021-1030) Syracuse, NY: Springer – Verlag Berlin Heidelberg.
2. Bransford, J., Brown, A.L & cocking, RR (Eds) (2000) *How people learn: brain, mind, experience and school* (2nd Ed.) Washington, D.C. National Academy Press.
3. Grimus, M. (2000, 21-25th Aug.) *ICT and multimedia in the primary school*. Paper presented at the 16th conference on educational uses of information and communication technologies. Beijing. China
4. Yelland, N. (2001) *Teaching and learning with information and communication technologies (ICT) for numeracy in the early childhood and primary years of schooling*. Australia: Department of Education, Training and Youth Affairs.
5. Lefebvre, S., Deaudelin, D. & Loiselle, J. (2006, 27th-30th November) *ICT implementation stages of primary school teachers: The practices and conceptions of teaching and learning*. Paper presented at the Austrian Association for Research in Education National Conference, Adelaide, Australia.
6. Dawes, L. (2001) *What stops teachers using new technology?* In M. Leask (Ed) *Issues in Teaching Using ICT*. London. Routledge.
7. Balanskat, A., Blamire, R. and Kefala, S. (2006) *A Review of studies of ICT impact on schools in Europe: European SchoolNet*.
8. Wong, A.F.L., Quek, C.L., Divaharan, S., Liu, W.C., Peer, J. & Williams, M.D. (2006) *Singapore students' and teachers' perceptions of computer-supported project work classroom learning environments*. *Journal of Research on Technology in Education*, 38(4), 449-479.
9. Iding, M., Crosby, M.E., & Speitel, T. (2002) *Teachers and technology: Beliefs and practices*. *International Journal of instructional medial* 129(2) 153-171.
10. Shama, J. H., Peressini, D. & Meymaris, K. (2004) *Technology-supported mathematics activities situated within an effective learning environment theoretical framework*. *Contemporary issues in technology and Teacher Education*, 3(4), 362-381.
11. Romeo, G.I (2006) *Engage, empower, enable: developing a shared vision for technology in education* In M.S. Khine (Ed.) *Engaged Learning and Emerging Technologies*. The Netherlands: Springer science.
12. Grape, M. & Grabe, C. (2007) *Integrating technology for meaningful learning* (5th Ed.) Boston. Ny: houghton Mifflin.
13. British Educational Communication and Technology Agency (Becta) 2003: *A Review of the research literature and barriers to the uptake of ICT by teachers*. <http://www.becta.org.uk>
14. Schoepp, C. (2005) *Barriers to technology integration in a technology-rich environment*. *Learning and Teaching in Higher Education: Gulf perspectives*, 2(1), 1-24.
15. Ertmer, P. (1999) *Addressing first and second order barriers to change: strategies for technology integration*. *Educational Technology Research and Development*, 47(4) 47-61.
16. Al-Alwani, A. (2005) *Barriers to integrating Information Technology in Saudi Arabia Science Education*. Doctoral dissertation. University of Kansas. Kansas.
17. British Educational Communication and Technology Agency (Becta) 2004 <http://www.becta.org.uk>
18. Pelgrum, W. J. (2001) *Obstacles to the integration of ICT in education: results from a worldwide educational assessment*. *Computers & education*, 37, 163-178.
19. Beggs, T. A. (2000, April 9-11, 2000) *Influences and barriers to the adoption of instructional technology*. Paper presented at the proceedings of the Mid-South Instructional Technology Conference, Murfreesboro, TN.
20. Cox, M., preston, C. & Cox, K. (1999b) *what motivates teachers to use ICT?* Paper presented at the British Educational Research Association Annual conference.

21. Osborne, J. & Hennessy, S. (2003) *Literature review in science education and the role of ICT: promise, problems and future directions*. London: Futurelab.
22. Cox, M., Preston, C. & Cox, K. (1999a) *What factors support or prevent teachers from using ICT in their classrooms?* Paper presented at the British Educational Research Association Annual Conference.
23. Newhouse, P. (2000) *Literature review: the impact of ICT on learning and teaching*. Perth, Western Australia: Department of Education.
24. Al- Oteawi, S. M. (2002) *The perception of administrators and teachers in utilizing information technology in instruction, administrative work, technology planning and staff development in Saudi Arabia*. Doctoral dissertation. Ohio University. Ohio
25. Empirica (2006) *Benchmarking access and use of ICT in European schools 2006: Final report from Head teacher and Classroom Teacher Surveys in 27 European Countries*. Germany: European Commission.
26. Watson, A. (1999) *Barriers to the integration of the internet into teaching and learning. Professional development*. Paper presented at the Asia Pacific Regional Internet Conference on Operational Technologies.
27. Sicilia, C. (2005) *The challenges and benefits to teachers' practices in constructivist learning environments supported by technology*. Unpublished masters' thesis. McGill University. Montreal.
28. Lewis, S. (2003) *Enhancing Teaching and Learning of Science through of ICT: Methods and Materials*. *School Science Review*, 84(309), 41-51.